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Veterinary Parasitology 110 (2002) 131–135

veterinary
parasitology

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Short communication

Transplacental toxoplasmosis in a reindeer (*Rangifer tarandus*) fetus

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Received 28 August 2002; received in revised form 25 September 2002; accepted 25 September 2002

Abstract

Toxoplasma gondii infection was diagnosed in a full term stillborn reindeer (*Rangifer tarandus*) fetus. The fetus had encephalitis and placentitis associated with *T. gondii*. Tissue cysts were identified histologically in sections of brain and tachyzoites were present in placenta and the myocardium. Protozoa in the brain, heart, and placenta stained positively with *T. gondii* antibodies, but not with *Neospora caninum* antibodies in an immunohistochemical test. The dam of the fetus had a 1:12,800 titer to *T. gondii* in the modified agglutination test employing whole tachyzoites and mercaptoethanol. This is the first confirmed report of *T. gondii* infection in reindeer.

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Keywords: *Toxoplasma gondii*; Reindeer; *Rangifer tarandus*; Abortion; Placentitis; Encephalitis

1. Introduction

Toxoplasma gondii can cause transplacental toxoplasmosis in many species of warm-blooded animals including humans (Dubey and Beattie, 1988). Although antibodies to *T. gondii* have been found in naturally exposed reindeer (Oksanen et al., 1997) and *T. gondii* can cause fatal infection in experimentally infected reindeer (Oksanen et al., 1996), as yet there is no report of proven *T. gondii* infection in a naturally infected reindeer. The purpose of the present report is to document fatal transplacental toxoplasmosis in a reindeer (*Rangifer tarandus*). This is a new host record for *T. gondii* infection.

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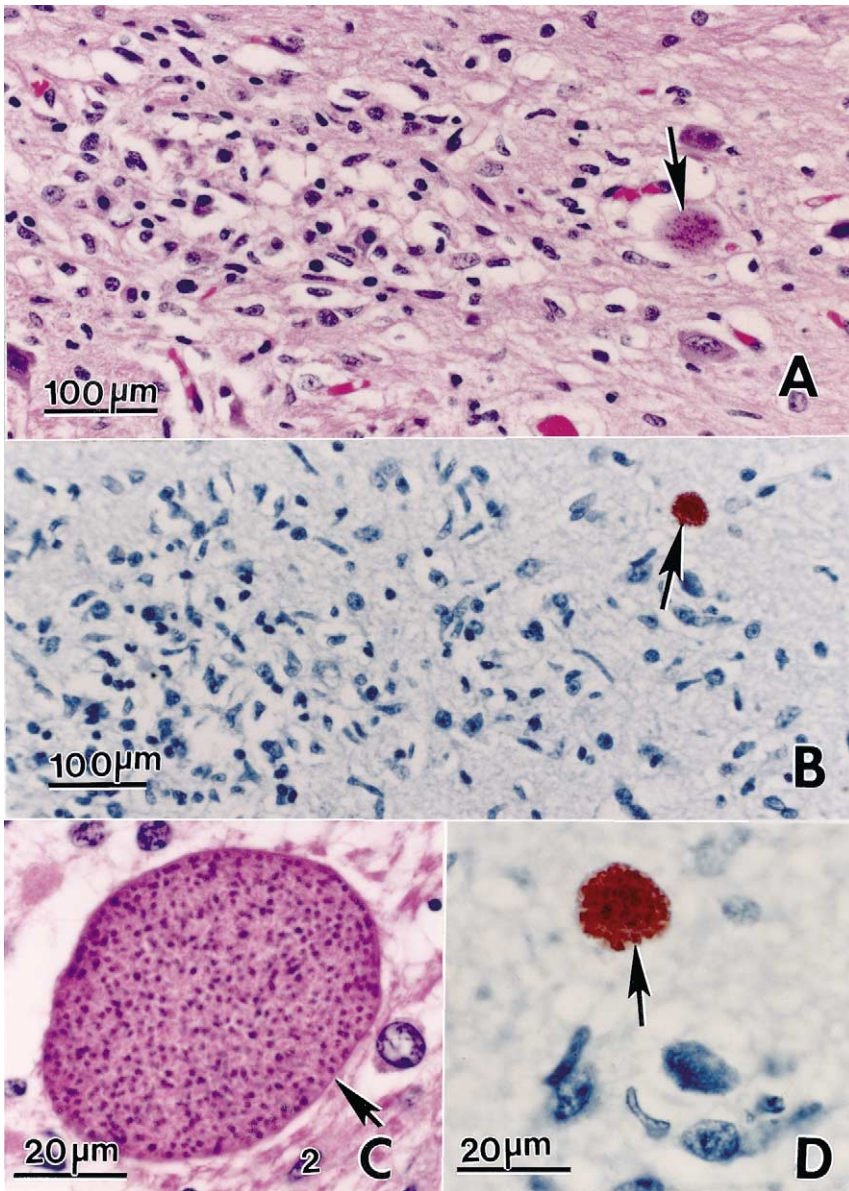


Fig. 1. *T. gondii* in sections of brain from the aborted reindeer fetus. (A, B) Focal encephalitis with infiltration of glial and mononuclear cells. Arrows points to a tissue cyst, H&E stain. (B) Immunohistochemical stain with anti-*T. gondii* antibodies. Arrows points to a tissue cyst. (C) A tissue cyst with a thin tissue cyst wall (arrow) in the cerebellum. (D) Higher magnification of the *T. gondii* (arrow) group in B.

2. Material and methods

A 3.5 kg, 47 cm (crown to rump length), male, full term reindeer fetus and placenta from a private farm in Burleson, TX, were submitted for diagnosis to the Texas Veterinary Medical Diagnostical Laboratory, College Station, TX. A complete necropsy on the fetus was performed. Specimens of heart, lung, spleen, rumen, liver, placenta, urinary bladder, small intestine, colon, tongue, kidney, adrenal gland, esophagus, trachea, skin, spinal cord, and brain were fixed in 10% buffered neutral formalin. Paraffin-embedded sections were

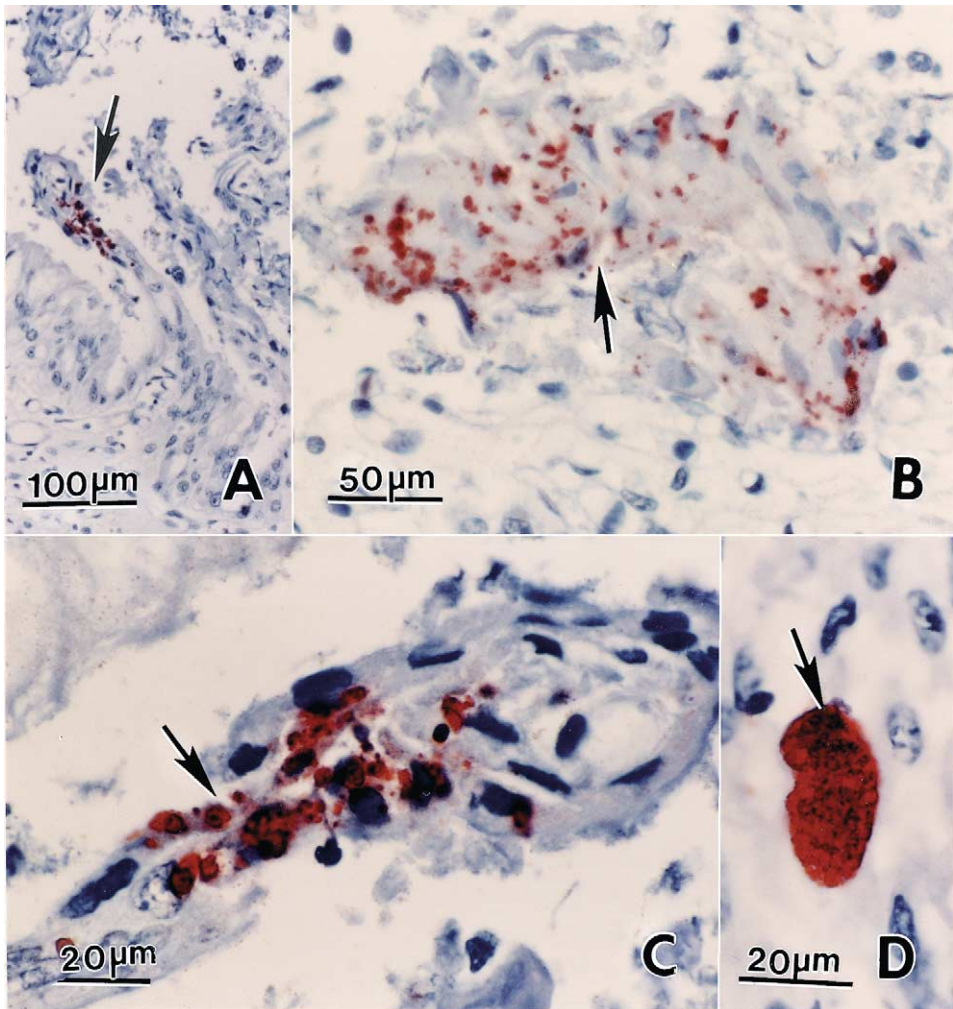


Fig. 2. Lesions and *T. gondii* in tissues of the reindeer fetus. Immunohistochemical staining with anti-*T. gondii* antibodies. (A–C) Placental villi with focal necrosis and *T. gondii* (arrows). (D) Group of organisms (arrow) in the myocardium.

cut at 5 μ m thickness, stained with hematoxylin and eosin, and examined microscopically. Retrospectively, paraffin sections of certain organs were stained immunohistochemically with *T. gondii* and *Neospora caninum* rabbit polyclonal antibodies using methods described previously (Lindsay and Dubey, 1989). A serum sample was obtained from the dam of the fetus 3 months post-abortion and it was tested for antibodies to *T. gondii* by the modification agglutination test (MAT) as described previously (Dubey and Desmonts, 1987).

3. Results

Lesions were confined mainly to the brain and the placenta. The cotyledons of the placenta were hemorrhagic and contained white flecks of friable material. Multiple scattered foci of necrosis and parenchymal loss accompanied by peripheral microglial infiltration were seen in the cerebrum (Fig. 1A and B) and the cerebellum.

The placental lesions consisted of focal of necrosis of cotyledonary villi associated with degenerating tachyzoites (Fig. 2A–C). A group of *T. gondii* organisms was seen in the myocardium without any host response. Parasites in the brain, placenta, and the heart stained positively with anti-*T. gondii* antibodies (Fig. 1B and D, Fig. 2A–D) but not with anti-*N. caninum* antibodies. *T. gondii* antibody MAT titer of the dam was 1:12,800.

4. Discussion

The diagnosis of toxoplasmosis in the reindeer fetus was made based on lesions, morphology of the parasite, immunohistochemical staining with *T. gondii* antibodies, and the finding of antibodies to *T. gondii* in the dam. Lesions were found in the brain and placenta of the reindeer and consisted of multifocal nonsuppurative encephalitis and focal necrosis in cotyledonary villi of the placenta. Lesions similar to those seen in reindeer are found in fetuses aborted due to toxoplasmosis in goats and sheep (Dubey and Beattie, 1988). A thin-walled tissue cyst containing numerous small bradyzoites with terminal nuclei was found in a histologic section of the reindeer cerebellum. The protozoan in the brain, heart, and placenta reacted positively to *T. gondii* antibodies but not to *N. caninum* antibodies. Additionally, the dam of this infected reindeer fetus had a high antibody titer to *T. gondii*. It is not possible to estimate the time of *T. gondii* infection in the dam because high antibody titers can also be present in asymptomatic reindeers (Oksanen et al., 1996, 1997). An experimentally infected reindeer developed a MAT titer of 1:1600 by day 14 p.i. and titers of 1:6400 or more persisted from 22 to 148 days after feeding oocysts (Oksanen et al., 1996). Oksanen et al. (1997) found MAT antibodies to *T. gondii* in 24 of 2577 sera from adult reindeers from a slaughter house in Finland; 12 had titers of 1:6000 or more. These data indicate that adult reindeer may serve as carriers of *T. gondii*.

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